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PATENT SPECIFICATION

DRAWINGS ATTACHED

955,845

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International Classification: —B 64 d (B 64 c, F 02 c, k, F 06 r)

COMPLETE SPECIFICATION

Improvements in Vertical Take-off and Landing Aircraft

I, ROBERT POUIT, a French citizen, of 3 rue Auguste Mayet, Asnieres, France, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The invention relates to short take-off and landing aeroplanes and to vertical take-off and landing aeroplanes.

Conventional fixed-wing aeroplanes require substantial velocity before the air-flow around the lift-producing wings is sufficient to produce enough lift for take-off and flight. Such aeroplanes therefore require a considerable amount of space for take-off or landing.

It is an object of the invention to provide a fixed-wing aeroplane which requires little or no translatory motion to produce a sufficient air-flow around the lift-producing wings to obtain enough lift for take-off or flight.

An aeroplane according to the invention has a wing and a laterally-extending auxiliary member mounted ahead of the wing and arranged to generate a rearward air flow around the wing to provide lift, the wing having blown flaps for increasing the lift produced by the air flow.

Embodiments of the invention will be described, by way of example, with reference to the accompanying drawings in which: —

Fig. 1 is a partly sectioned side view of an embodiment of the invention,

Fig. 2 is a plan view of the aeroplane of Fig. 1,

Fig. 3 is a partly sectioned plan view of turbo-jet engines carried on the aeroplane shown in Fig. 1.

Fig. 4 is a chordwise section of a wing of the embodiment shown in Fig. 1, and Fig. 5 is a section of a preferred form of the auxiliary member.

The aeroplane shown in Figs. 1 to 4 comprises a wing 1 fixed to a fuselage 2 which carries ahead of the wing 1 and preferably, as shown, slightly above it, an auxiliary member 3 extending transversely to the fore-and-aft direction of the fuselage. The auxiliary member 3 includes spanwise conduits 25_1, 26_1, 25_2 and 26_2 (Fig. 2). The conduits 25_1 and 25_2 have rearwardly opening slot-like nozzles 5 and conduits 26_1 and 26_2 communicate directly along their length with conduits 25_1 and 25_2 respectively. The auxiliary member 3 has a flap 6 adjacent its lower trailing edge arranged to leave a slot 7 between it and the nozzles 5. Preferably, as shown, the auxiliary member has an aerofoil-shaped cross-section.

Two similar turbo-jet engines 9_1 and 9_2 are provided, one on each side of the longitudinal axis of the fuselage.

Fig. 3 shows a horizontal section of the turbo-jet 9_2 which comprises a first compressor 20_2, a second compressor 22, a turbine 23 which drives the second compressor 22 by means of a hollow shaft 19, a second turbine 21 which drives the first compressor 20_2 by means of a shaft 18 which passes through the hollow shaft 19.

The turbo-jet engines 9_1 and 9_2 feed conduits 25_2 and 26_1 and conduits 25_1 and 26_2 respectively, with compressed gas. As shown in Fig. 3 the turbo-jet engine 9_1 feeds compressed air from a compressor 20_1 to conduit 26_1 and exhaust gases to conduit 25_2 and similarly, the turbo jet 9_2 feeds compressed air to conduit 26_2 from a compressor 20_2 to conduit 26_2 and exhaust gases to conduit 25_1.

Thus, if one turbo-jet engine fails, the nozzles 5 on each side of the aeroplane will continue to be fed with compressed gas from the second turbo-jet engine.

In operation, therefore, the turbo-jet engines 9_1 and 9_2 produce a high speed rearward flowing gas-stream from the nozzles 5. This high-speed gas-stream entrains some of the surrounding air which enters through slot 7.

[*Price* 4*s*. 6*d*.]

Further air is entrained by the gas-stream as it leaves the auxiliary member 3 and the high-speed low mass gas-stream from the nozzles 5 thus produces a low-speed high mass air stream which surrounds the wing 1 thus producing sufficient lift for take-off with little or no translation of the aeroplane.

The wing 1 is provided with flaps 12 and 33 over which compressed air is blown. The compressed air may be provided by the turbo-jet engines 9_1 and 9_2 but preferably it is provided by a rear turbo-jet engine 10 which feeds the air through conduits 13 within the wing to the flaps 33 and 12. These blown flaps further increase the lift produced by the airflow coming from the nozzles 5. In addition, the flaps 33 and 12 are pivoted on pivots 11 and may be turned downwards so as to deflect into a vertical direction the stream of gas blown from the auxiliary member over the wing 1.

The exhaust gases from the turbo-jet engine 10 in normal flight flow out horizontally to supply forward thrust but when increased lift is required the exhaust gases may be deflected downwards by means of a jet deflector (not shown).

Forward propulsion of the aeroplane is provided by the reaction of the gas-stream leaving the nozzles 5 and by the exhaust gases from the rear turbo-jet engine 10.

A preferred form of the auxiliary member 3 is shown in Fig. 5. The auxiliary member comprises a conduit 26 which communicates with a conduit 25 through apertures 24. The conduit 26 is fed with compressed air from the compressor of the turbo-jet engine on one side of the fuselage and the conduit 25 is fed with exhaust gases from the turbo-jet engine on the other side of the fuselage in a similar manner to that described previously with reference to Figs. 1 to 4.

A subsidiary conduit 28 feeds fuel to the conduit 25 and the hot exhaust gases ignite the fuel producing an after-burning effect which increases the velocity of the air-stream leaving the rearwardly-facing nozzles 5. Such an after-burning effect will normally be reserved for take-off, landing and very low-speed flight or at any other time when increased lift is desirable.

The upper front surface 15 of the auxiliary member shown in Fig. 5 is hinged on a spanwise hinge 36 so that it may be moved between the two positions shown in the figure. When the surface 15 is in its raised position it forms an induction means whereby air is fed to the nozzles 5 thus increasing the amount of air which is entrained by the gas stream from the nozzles 5. Advantageously, the lower side of the auxiliary member includes two slots 38 and 39. As with the previously described construction, the high-speed low mass gas stream leaving the nozzles 5 is converted into a low-speed high mass of gas which surrounds the wing 1.

In normal flight, the section 15 can be moved to its lower or closed position indicated by dotted lines in the figure so that the auxiliary member has an aerofoil section and forms an auxiliary lift-producing wing with gas blow from its trailing edge. To improve the laminar flow over the auxiliary member the hinge 36 is covered by a spring plate 17.

The laminar flow over the auxiliary member will be improved by providing orifices 37 in the section 15 for sucking the friction layer through the suction action of the air-stream leaving the nozzles 5.

Preferably flap 6 and member 14 are pivoted on pivots 35 and 36 respectively so that they may be used to improve the stability by functioning as conventional flaps or ailerons.

WHAT WE CLAIM IS:—

1. An aeroplane having a wing and a laterally-extending auxiliary member mounted in front of the wing and arranged to generate a rearward air flow around the wing to provide lift, the wing having blown flaps for increasing the lift produced by the gas flow.

2. An aeroplane as claimed in claim 1 in which the blown flaps are supplied with compressed air from a turbo-jet engine serving for the propulsion of the aircraft.

3. An aeroplane as claimed in claim 1 or 2 in which the auxiliary member includes nozzle means from which gas can be ejected to form a laminar jet and structure associated with the nozzle means whereby the gas jet is caused to entrain surrounding air to produce the air flow.

4. An aeroplane as claimed in claim 3 in which the auxiliary member is of aerofoil section and the said structure includes an element movable between a closed position in which it forms the surface of the auxiliary member and an open position in which it forms one boundary of an air induction passage open to the front of the aircraft.

5. An aeroplane as claimed in claim 4 in which the induction passage is a rearwardly-convergent diffuser.

6. An aeroplane as claimed in claim 4 or 5 in which the movable element has suction orifices so arranged that the gas jet will suck air through the orifices when the element is in the closed position to improve the air flow over the auxiliary member.

7. An aeroplane as claimed in claim 3, 4, 5 or 6 in which the auxiliary member is connected to a jet engine or engines serving for the propulsion of the aircraft in normal flight, at least part of the gases from which can be diverted to the nozzle means to produce the gas jet.

8. An aeroplane as claimed in any one of

claims 3 to 6 in which the nozzle means are connected to a turbo-jet engine producing a stream of turbine exhaust gases and a stream of compressed air through separate conduits for the two streams extending along the auxiliary member, the conduit for the exhaust gases communicating directly with the nozzle means and the conduit for the air communicating with the conduit for the exhaust gases through a slot and burners being provided for burning fuel in the compressed air supplied through the air conduit.

9. An aeroplane as claimed in claim 8 including two turbo-jet engines each producing a gas stream and a compressed air stream, the nozzle means on each side of the aircraft being fed by the gas stream of one engine and the air stream of the other.

10. An aeroplane as claimed in any of the preceding claims in which the auxiliary member is provided with a stabilising flap or flaps.

11. An aeroplane substantially as described with reference to Figs. 1, 2, 3 and 4 of the accompanying drawings.

12. An aeroplane as claimed in claim 11 with the modification described with reference to Fig. 5 of the accompanying drawings.

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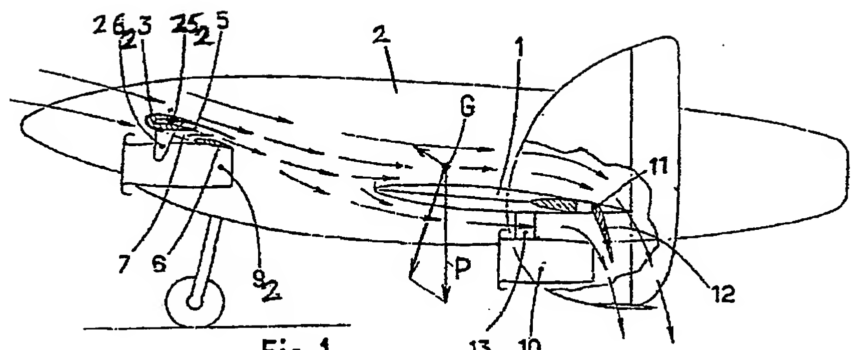

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Fig. 1

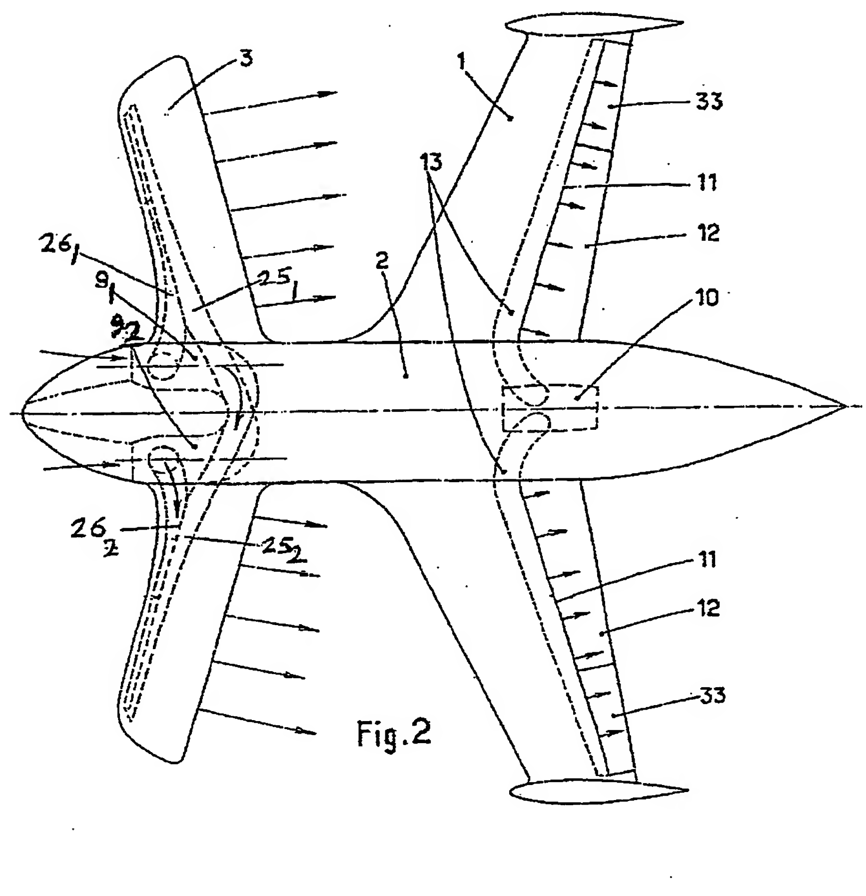

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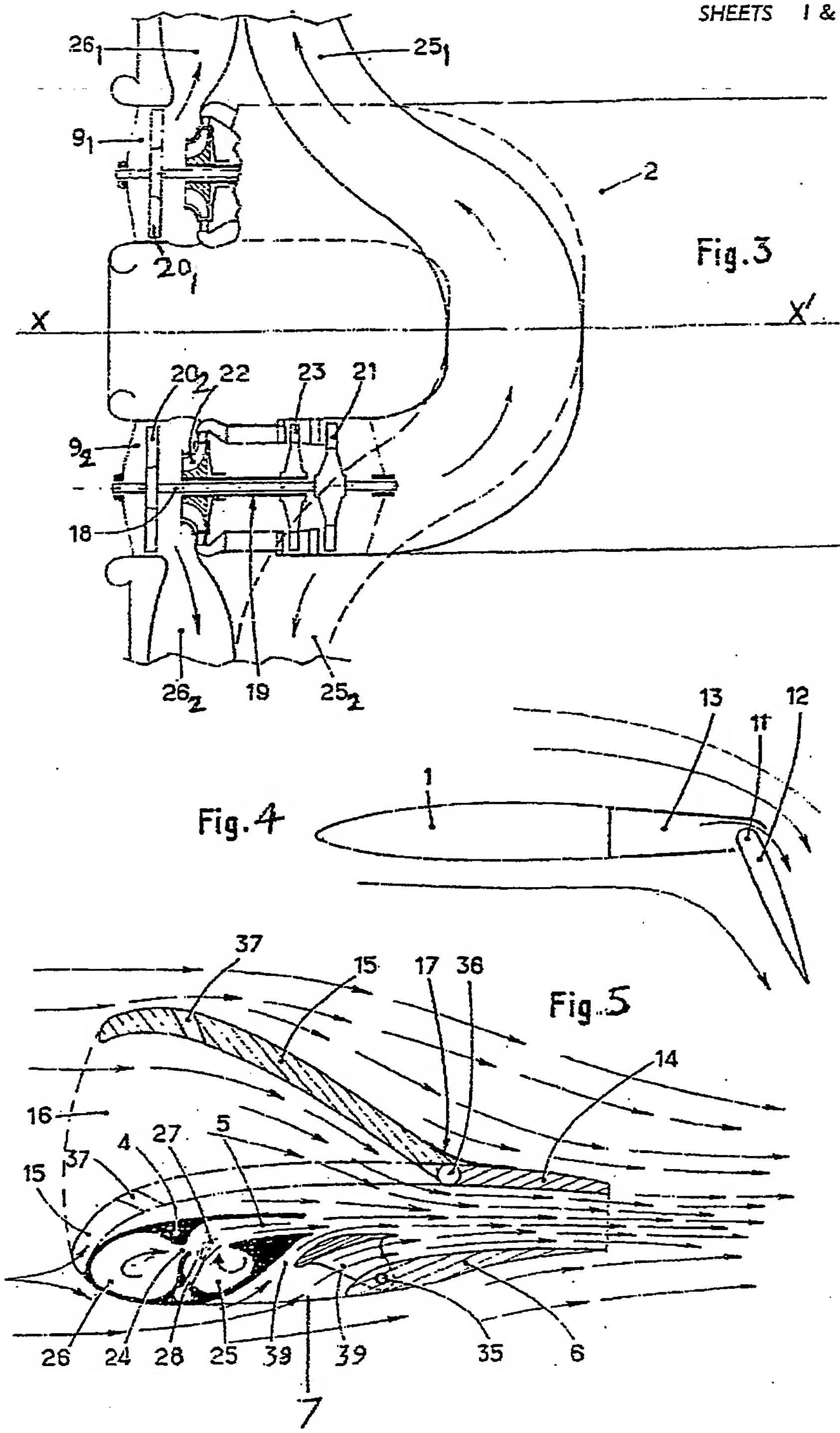
Fig. 2

955,845 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*
SHEETS 1 & 2



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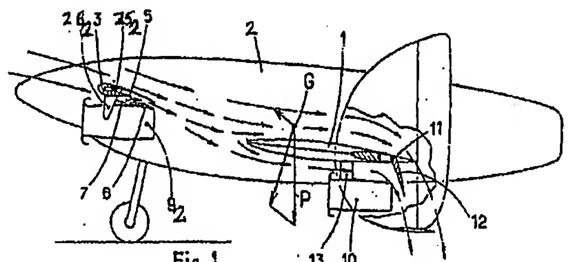

Fig. 1

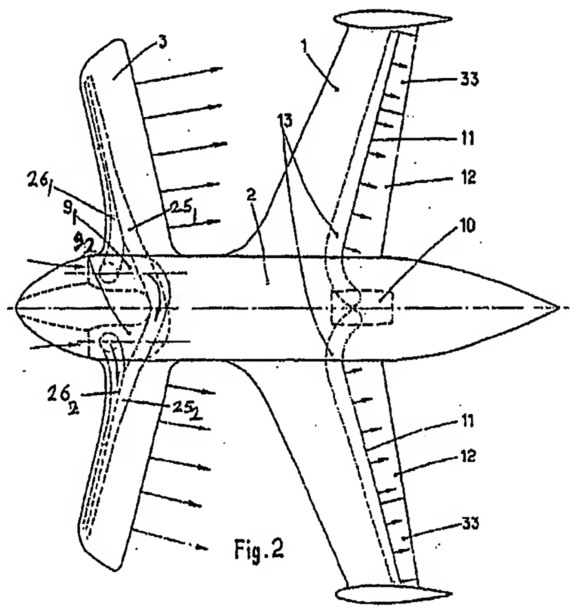

Fig. 2

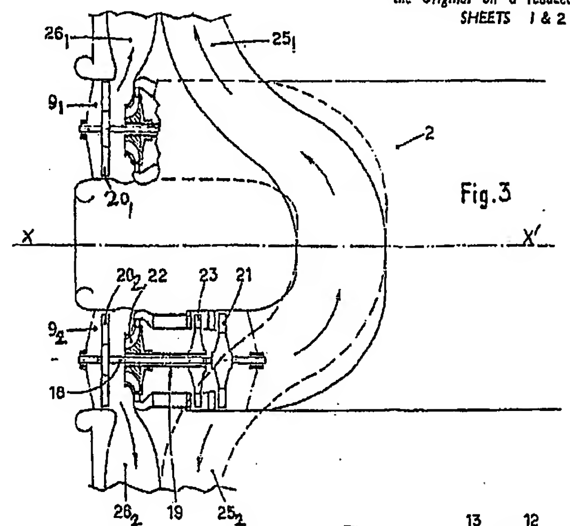

Fig. 3

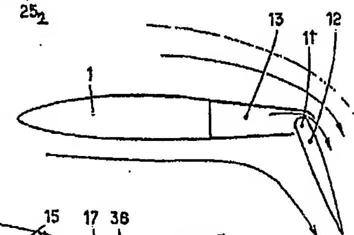

Fig. 4

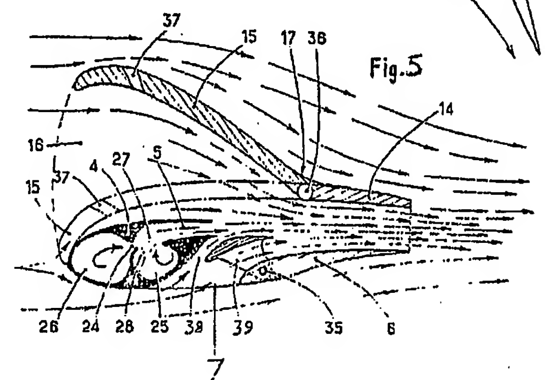

Fig. 5